

PATENT CLAIMS

1. Supply system (10) for the delivery of elements (130, 150) to one or more users (12) comprising a forwarding device (or feeder) (76, 76', 76") which supplies the elements from a stored quantity (78) of the elements to a sorting device (70, 70'), which only permits elements having a predetermined position to pass and with a transport device (72, 72'), which transports the positionally correctly sorted elements (130, 150) to the user (12), characterized in that the forwarding device (76, 76', 76") forms part of a basic module (40) while the sorting device (70, 70') and the transport device (72, 72') belong to an interchangeable module.
2. Supply system in accordance with claim 1, characterized in that the basic module (40) is designed for the handling of a plurality of different elements (130, 150).
3. Supply system in accordance with claim 1, characterized in that the elements (130, 150) can be filled true-to-type into respective supply chambers of the basic module (40).
4. Supply system in accordance with claim 1, characterized in that the elements (130, 150) can be filled as a mixture into a supply chamber (78) or into a plurality of supply chambers of the basic module (40).
5. Supply system in accordance with claim 4, characterized in that the forwarding device (76, 76', 76") is either designed for the simultaneous conveyance of the elements (130, 150) from all supply chambers

of the basic module (40) or as respective forwarding units for each supply chamber individually.

6. Supply system in accordance with claim 1, characterized in that the basic module (40) has, in addition to the forwarding device from the supply chamber or supply chambers, a mobile installation platform (34).
7. Supply system in accordance with claim 6, characterized in that functional devices which are designed independently of the elements, such as for example an electrical control cupboard (38) with a display device, a pneumatic supply (96), an oiling device (98) and/or noise and/or safety protection devices are associated with the basic module (40) and are preferably secured directly or indirectly to the mobile mounting platform (34).
8. Supply system in accordance with claim 1, characterized in that the control cupboard includes at least some of the following components or carries out at least some of the following functions:
 - a) mains connection,
 - b) input and output units,
 - c) programmable control for the control or regulation of operating parameters, such as for example the switching on and off of the forwarding device (76, 76', 76''), for the control or regulation of the working speed of the forwarding device (76, 76', 76''), for the regulation of the pressure of the transport device (72, 72'), and also in a manner specific both to the elements and to the particular application for the regulation of the supply pressure of setting heads (20,

20"), which may be connected to the transport device (72, 72', 72"), and of the pressure of the oiling device (98)

- d) a recognition device for the recognition of the functional component groups (70, 70', 72, 72'), which are present at the interchangeable module (42, 42', 42") and connected to the basic module (40),
- e) connections to which signals from sensors present at the basic module (40) or at the interchangeable module (42, 42', 42") or at the user (12), such as for example filling state measuring sensors on the basic module (40), and end switches, end position sensors at the transport device (72, 72', 72") and in the setting head (20, 20') can be applied and, if required,
- f) one or more connection lines (26, 28, 30) for the signal transmission between the supply system (10) and the user (12) and/or from the user (12) to the supply system (10).

9. Supply system in accordance with claim 1, characterized in that a pneumatic supply (96) is provided, which includes at least some of the following components: a filter, an oiler, a water separator, valves, power units and also one or more termination devices and optionally a compressor unit.

10. Supply system in accordance with claim 1, characterized in that an oiling device (98) is provided for the oiling of the elements (130, 150), and also of the mechanical parts which enter into contact with the latter, and is associated with the basic module (40).

11. Supply system in accordance with claim 1, characterized in that a noise protection means is provided, for example in the form of

acoustic insulation in the region of the forwarding device (76, 76', 76").

12. Supply system in accordance with claim 1, characterized in that a safety device is provided in the form of screening means which prevent access to the forwarding device during operation of the same, for example in the form of a cover (80) with a switching on and switching off contact, with the screen and/or the cover (80) optionally being acoustically insulating.
13. Supply system in accordance with claim 1, characterized in that the sorting device (70, 70') consists of one sorting unit or of a plurality of like or different sorting units.
14. Supply system in accordance with claim 13, characterized in that with a plurality of like sorting units (70, 70'), the conveyor device (76, 76', 76") distributes like elements to all sorting units (70, 70') which are in operation and coupled to the basic module (40).
15. Supply system in accordance with claim 13, characterized in that the transport device (72, 72') has a plurality of different sorting units to which the correspondingly different elements can be supplied either from a mixture present in a supply chamber (78) or separately, true-to-type from different supply chambers.
16. Supply system in accordance with claim 1, characterized in that the basic module (40) includes one or more emptying openings, which lies or lie at the lowest point of the supply chamber (78), with the or each supply chamber enabling, via walls which converge to the said

emptying opening or openings, a problem-free emptying of the entire supply quantity through the or each emptying opening.

17. Supply system in accordance with claim 14, characterized in that the or each supply chamber (78) enables a problem-free visual and optical check of the emptied state.
18. Supply system in accordance with claim 1, characterized in that the interchangeable module (42, 42', 42") or the interchangeable modules (42, 42', 42") is or are connectable via respective quick change couplings (45, 46, 60, 62) to the basic module (40) or to functional units (35) mounted on its mounting platform (34), and indeed in the sense of a rapid mechanical connection of the interchangeable module (42, 42', 42") to the basic module (40), a rapid electrical connection to the control cabinet (38) and a rapid pneumatic connection to the pneumatic system and also, optionally, a rapid connection to the oiling system (98).
19. Supply system in accordance with claim 1, characterized in that a transport carriage (50) is provided for the interchangeable module (42, 42', 42") and preferably has space for two or more interchangeable modules (42, 42', 42").
20. Supply systems in accordance with claim 19, characterized in that both the platform (34) of the basic module (40) and also the transport carriage (50) have their own rail means (44, 48), whereby an interchangeable module (42, 42', 42") located on the rail means (44) of the basic module (40) can be shifted onto the rail means (48) of the transport carriage (50), and an exchangeable module (42, 42', 42") located on the rail means (48) of the transport carriage can be

shifted onto the rail means (44) of the basic module, wherein a latching device (46) is preferably provided in order to non-displaceably latch the interchangeable module (42, 42', 42'') located on the rail means of the basic module (40) with the basic module (40).

21. Supply system in accordance with claim 20, characterized in that the transport carriage (50) is designed to receive at least two interchangeable modules which each have space on the rail means (48) and in that the rail means (48) are either located on a rotary table of the transport carriage or the transport carriage can be aligned by means of corresponding wheels (52), with the basic module at two positions displaced by 180°.
22. Supply system in accordance with claim 1, characterized by a lifting means (100), whereby an interchangeable module (42, 42', 42'') located on the basic module (40) can be lifted from the basic module (40) and placed onto the transport carriage (50), and an interchangeable module (42, 42', 42'') located on the transport carriage (50) can be lifted from the latter and placed onto the basic module (40), with an alignment device (35, 45) or a centering device preferably being provided on at least the basic module (40), and preferably also on the transport carriage (50), in order to non-displaceably place the interchangeable module (42, 42', 42'') on the basic module (40) or the transport carriage (50) respectively during its placement on the basic module (40) or onto the transport carriage (50), whereby a latching device (46) is optionally also providable.

23. Supply system in accordance with claim 1, characterized in that the basic module (40) has a receiving bay (112) for the interchangeable module (42, 42', 42"'); in that the transport carriage (50) can be moved at least partly into the receiving bay (112), and the basic module (40) and/or the transport carriage (50) is equipped with a device (104) for the lifting or placement of the interchangeable module (42, 42', 42") from and onto the basic module (40).
24. Supply system in accordance with claim 23, characterized in that a guide means (35) is provided on the basic module (40), preferably in the marginal region of the receiving bay (112) in order to center or align the interchangeable module (42, 42', 42") during its placement.
25. Supply system in accordance with claim 23, characterized in that the transport carriage (50) forms a unit together with the interchangeable module (42, 42', 42") and can be secured with this module on the basic module (40), with the wheels (52) of the transport carriage (50) being preferably raisable and lowerable for the placement and lifting of the interchangeable module (42, 42', 42").
26. Method for the operation of a user (12) which receives elements (130, 150) from a supply system (10), wherein the supply system (10) includes a forwarding device (76, 76', 76") for the delivery of elements (130, 150) to the user, with the forwarding device (76, 76', 76") supplying the elements (130, 150) from a supply quantity (78) to a sorting device (70, 70'), which only permits elements having a predetermined positioned path to pass and which is equipped with a transport device (72, 72'), which transports the positionally correctly sorted elements (130, 150) to the user (12), characterized in that,

with a change of the elements (130, 150) required by the user (12), an interchangeable module (42, 42', 42") including the sorting device (70, 70') and the transport device (72, 72') is separated from a basic module (40) including the forwarding device (76, 76', 76") and is removed from the area of the basic module (40) while a further interchangeable module (42, 42', 42") which is matched to the changed requirements of the user (12) is coupled to the basic module (40) via quick change devices (35, 45, 60, 62) and taken into operation.

27. Method in accordance with claim 26, characterized in that the interchangeable modules (42, 42', 42") are transported away from the basic module (40) and transported to the basic module (40) on a transport carriage (50); and in that the interchangeable modules (42, 42', 42") are transported away from the basic module (40) and to the basic module (40) on a transport carriage (50); and in that the interchangeable modules (42, 42', 42") are pushed via rail means (44, 48) or roller means from the basic module (40) onto the transport carriage (50) and from the transport carriage (50) into the basic module (40) and are latched there.
28. Method in accordance with claim 26, characterized in that the interchangeable modules (42, 42', 42") are transported to the basic module (40) and away from the basic module (40) on a transport carriage (50), with the interchangeable module (42, 42', 42") to be removed from the basic module (40) being lifted by means of a lifting device (100) from the basic module (40) and placed onto the transport carriage (50); and in that the interchangeable module (42, 42', 42") to be inserted into the basic module (40) is, optionally, lifted by the lifting device (100) from the transport carriage (50) and set down

onto the basic module (40) after turning the transport carriage (50) around, or after rotation of a rotary table located on the transport carriage (50).

29. Method in accordance with claim 26, characterized in that the interchangeable module (42, 42', 42'') located on a transport carriage (50) in the basic module (40) is separated from the basic module (40) by lifting the interchangeable module (42, 42', 42'') relative to the transport carriage (50) or by lifting a platform (51) of the transport carriage (50) with the interchangeable module (42, 42', 42''), for example by means of extendable wheels (52) of the transport carriage (50), and is removed with the transport carriage (50) from a receiving bay (112) of the basic module (40); and in that the further interchangeable module (42, 42', 42'') on a preferably further transport carriage (50) is moved into the receiving bay (112) of the basic module (40) and/or docked onto the latter.
30. Supply system in accordance with claim 1, characterized in that a single supply chamber (78) is provided, and in that the exchangeable module comprises a plurality of sorting units (70, 70') and transport units (72, 72'), which are adapted to feed the same type and size of element supplied by the forwarding device (76, 76', 76'') from the single supply chamber.
31. Supply system in accordance with one of the preceding claims 1 to 25 and 30, characterized in that the sorting units and transport units of an exchangeable module are themselves modules adapted for rapid connection together and/or to a platform (51) to form the exchangeable module (42).